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Mazdoor Kisan Shakti Sangathan

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Jawaharlal Nehru

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IS 10682 (1983): Aircraft safety belts, lap type [TED 14:
Aircraft and Space Vehicles]

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Satyanaaranay Gangaram Pitroda

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“Knowledge is such a treasure which cannot be stolen”



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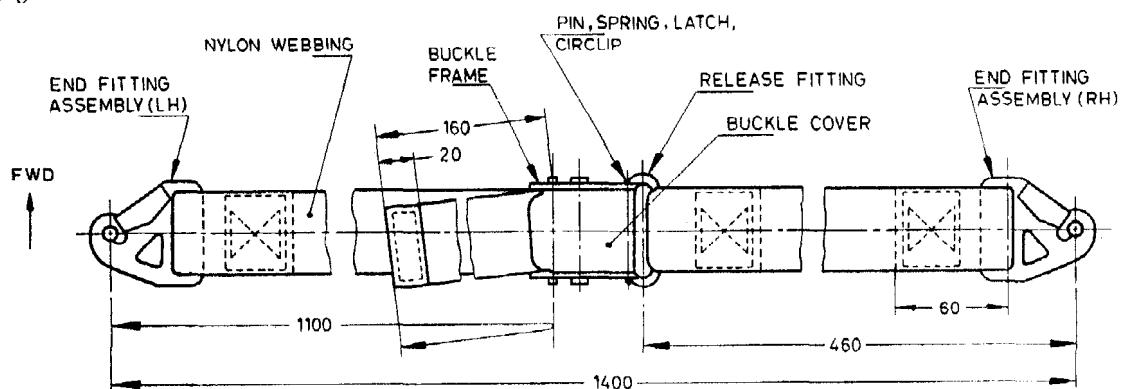
Indian Standard

SPECIFICATION FOR AIRCRAFT SAFETY BELTS, LAP TYPE

1. Scope — This standard lays down the requirements for the design and fabrication of single occupancy lap type aircraft safety belts used in transport planes for passenger seats and berths.

2. Design Requirements — A typical lap type safety belt is shown in Fig. 1.

The design of the belt and the means of locking and release shall be such that it is adjustable in length and incorporates a quick release mechanism. The action of fastening and tightening around the wearer shall be one of continuous, rapid and easy movement. The seat buckle shall be robust but simple in design.



All dimensions in millimetres.

FIG. 1 TYPICAL AIRCRAFT SEAT SAFETY BELT — LAP TYPE

Note 1 — Type and pattern of stitching is optional. However, it is suggested to have 7 to 9 stitches per 25 mm and ends of all stitching shall be back-stitched to a distance of not less than 12 mm.

Note 2 — Space line of stitching shall be atleast 4-8 mm apart.

Note 3 — Nylon thread No. 3 preferred for stitching.

2.1 The safety belt shall be individual for a single occupant and shall be suitable in every respect for installation in an approved airplane passenger seat, for the purpose of restraining the wearer against the ultimate inertia forces prescribed by statutory authorities.

2.2. Both metallic and non-metallic parts of the seat belt that come in contact with the wearer shall have no sharp edges. No part of the seat belt shall pass between wearer's legs or otherwise restrict the movement of wearer's limbs when properly fastened.

2.3 The parts of safety belt which are in contact with the wearer shall be not less than 50 mm in width.

3. Material — All materials used in the fabrication of safety belts or its components shall be of approved kind or quality which by experience or tests have established their suitability for use. The choice of materials and protective treatments, if any, shall be such as to avoid impairment in its strength or effectiveness due to corrosion, weathering, abrasion or other deteriorating causes during service.

3.1 The rated minimum breaking strength of the webbing used in the belt shall be atleast fifty percent greater than the rated strength of the complete belt assembly.

3.2 Where the webbing used is of nylon, it shall conform to IS : 8947-1978 'Material (nylon webbing) for aircraft safety belts'.

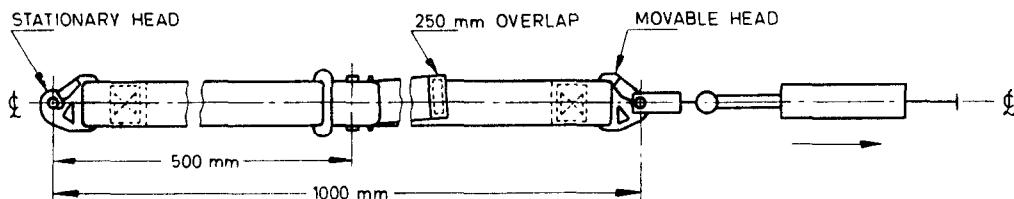
3.2.1 The nylon thread shall conform to IS : 4229-1978 'Specification for nylon sewing threads for aerospace purposes'.

3.3 The end fittings shall be of aircraft quality steel conforming to designation 40Ni2Cr1Mo28 of IS : 5517-1978 'Specification for steel for hardening and tempering' or any other alloy steel acceptable to the approving authority and meeting the strength requirements.

3.4 The buckle frame and cover shall be of aluminium conforming to IS : 8561-1977 'Specification for aluminium alloy clad sheet and strip for aircraft purposes (Alloy 76528)' or any other aluminium alloy suitable for aircraft purposes acceptable to the approving authority and meeting the strength requirements.

4. Performance Requirements and Tests — The seat belt assembly shall be subjected to load tests (proof, rated and ultimate loads) — as described in **4.1, 4.2, 4.3** and **4.4**. A safety belt is deemed to have conformed to the specification if it fully meets all the prescribed tests.

4.1 Proof Load Test — The arrangement for the test shall be as shown in Fig. 2. The test shall be carried out as follows:



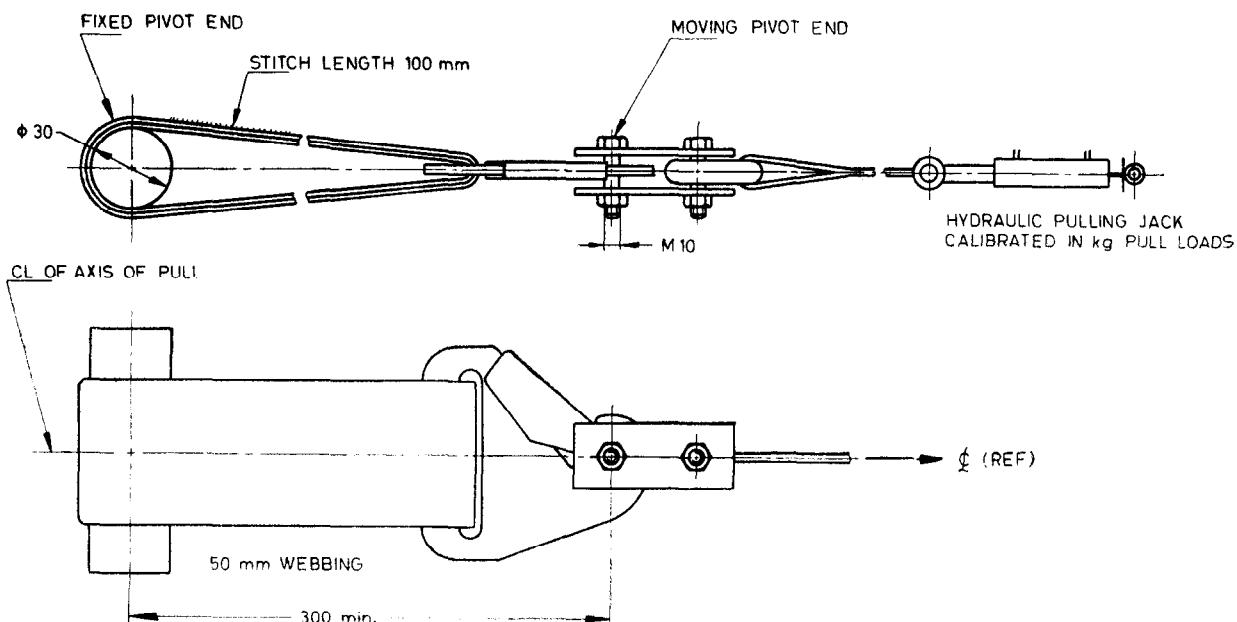
All dimensions in millimetres.

FIG. 2 PROOF LOAD TEST

Three identical samples shall be used to determine by average the strength of the safety belt assembly. The tests are to be conducted under normal atmospheric conditions prevailing at the time of testing. For belts with cam type buckles, the free end of the strap shall be minimum 250 mm beyond the locked point. After aligning axially, the ends are attached respectively to a stationary and a movable head. The belt shall be subjected to a tensile loading of 6670 N (680 kgf) for 30 seconds, with a traverse rate of 100 mm per minute. The load is released gradually. The total slippage in the adjusting arrangements or the quick release mechanism shall not exceed 25 mm.

At the end of the test, the seat belt assembly shall not show any failure, damage or slip to the webbing, stitching or metal parts. The buckle and latch release mechanism shall operate normally.

4.2 Rated Load Test — The arrangement for carrying out the rated load test shall be as shown in Fig. 3. The test shall be carried out as follows:



All dimensions in millimetres.

FIG. 3 BREAK LOAD TEST FOR END FITTING

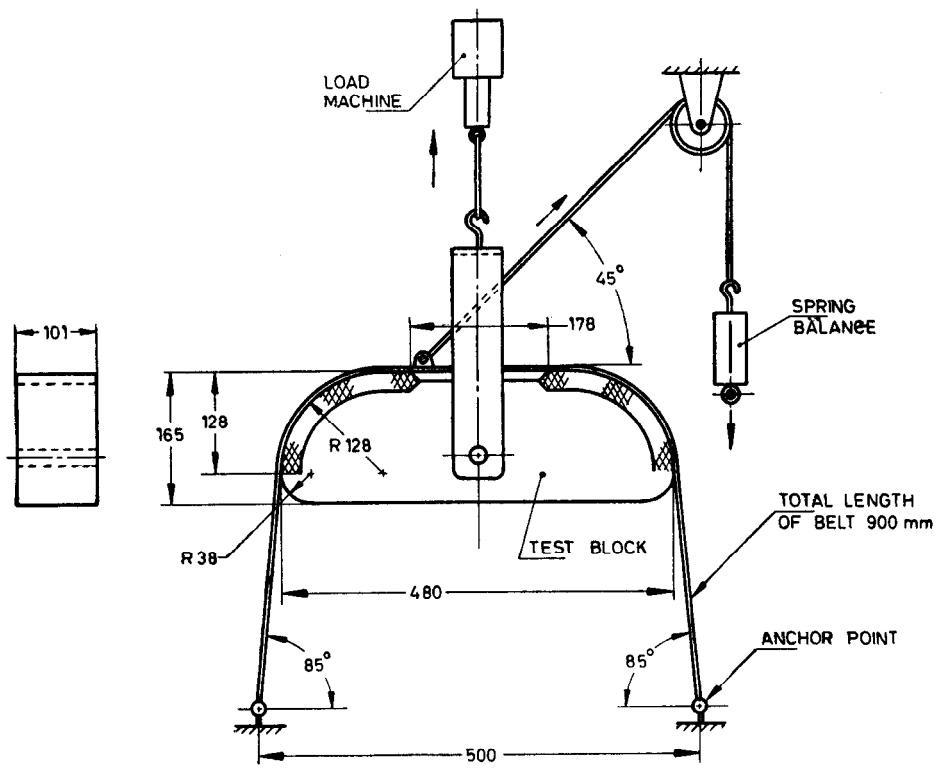
The seat belt assembly shall be subjected to a static load of 1.9 times the rated strength of the belt assembly, namely, 12 684N (1 293 kgf) for a period of 30 seconds. The rate of traverse of the heads shall be 25 mm per minute until the specified load is indicated.

After the rated load application, the loading is gradually released to 1108N (113 kgf). After the test, there shall be no evidence of failure, slippage, damage to the webbing, stitching or metal parts. The release mechanism shall also operate normally.

4.3 Pull Out Test — Shall be carried out after carrying out the load test as specified in 4.2 on the automatic locking mechanism with one hand disconnect. The quick release mechanism shall be subjected to a pull not exceeding 200 N (20.5 kgf).

After removal of the load the quick release mechanism shall show no sign of failure or sufficient deformation to prevent the operation of the release.

4.4 Break Load Test for End Fitting — The arrangement for carrying out the break load test for end fittings shall be as shown in Fig. 4. The test shall be carried out as follows:



All dimensions in millimetres.

FIG. 4 LOAD TEST — SAFETY BELT ASSEMBLY

A minimum of three fittings shall be subjected for the test and the average value computed for a particular design. The end fitting shall be pulled in straight tension to a rated load of 13 340N (13 60 kgf).

The fitting shall show no evidence of failure or distortion to prevent normal operation.

4.5 Ultimate Load Test — is carried out to ascertain the belt design by applying a tensile load at a uniform rate of traverse of 25 mm per minute till the specified load indicates 22 249 N (2 268 kgf). The testing arrangements shall be as shown in Fig. 3.

5. Packing — Shall be individually packed. The nature of packing shall be as agreed to between the purchaser and the supplier, suitably covered by regulations of the statutory authority.

6. Marking — Each passenger seat belt shall have the fabric label attached to each half of the belt assembly giving details of manufacturer's name or trade mark, part number, model number, date of manufacture, Indian Standard number and the approval mark of the statutory authorities.

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6.1 ISI Certification Marking — Details available with the Indian Standards Institution.

7. Sampling — Unless otherwise agreed upon between the purchaser and the supplier, the sampling plan shall be as given in IS : 2500 (Part 1)-1973 'Sampling tables : Part 1 Inspection by attributes and by count of defects (*first revision*)'. The recommended sampling plan and AQL are given in 7.1 and 7.2.

7.1 For visual and dimensional requirements, the sampling plan with inspection level III and AQL of 2.5 percent as given in Tables 1 and 2 of IS : 2500 (Part 1)-1973 may be followed.

7.2 For performance requirements the sampling plan with inspection level II and AQL of 1 percent given in Tables 1 and 2 of IS : 2500(Part 1)-1973 may be followed.

EXPLANATORY NOTE

This Indian Standard covers the lap type of safety belts used in civil aircraft. In the preparation of this standard assistance has been derived from NAS-802-1950 'Specification for aircraft safety belts', prepared by National Aircraft Standards Committee, USA.